

AMATEUR SATELLITE REPORT

AMSAT's Newsletter for the Amateur Space Program.



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Short Bursts

- In ASR 102, we omitted the address to which to write for info on ACSSB Level 1 kits. The address is: Project OSCAR, ACSSB-1, 15 Valdez Lane, Watsonville, CA, 95076. Please include an SASE. Tks and sri for address omission.
- We're saddened to learn of the passing of a friend of many of us, Fentin Martin, KH6OD, after a long illness. Details not available except the end came in hospital approximately 16 May.
- It is appearing more and more likely that the Arsene satellite of the French group, RACE, will be absent when the Ariane 4 #1 takes Phase 3C into orbit next summer. Word from F3HK, quoted by G3IOR, has it that kick motor problems have delayed progress to the point that schedule slippage is inevitable. RACE will be seeking a launch on Ariane 4 #2 or later according to these sources. Launch could come in Autumn 1986. Also scrapped due to schedule constraints will be the 10 GHz beacon experiment. Present plans call for a Mode B and a Mode S transponder.
- Next Ham-In-Space mission will include Tony England, W0ORE, with a launch date tentatively pegged at 15 July 85. The primary downlink frequency will be 145.55 MHz. Schools and clubs which wish to schedule QSOs should contact ARRL HQ ASAP. Tony says much of his time will be occupied on science efforts but that he will be operating as much as possible. Shuttle Challenger is due for a 7 day mission landing at Edwards AFB on 22 July. Also aboard is astronaut-ham John-David Bartoe, W4NTZ, who may also get in some operating time. The SSTV and the 2 meter transceiver used by W5LFL will be along for communications.
- Phyllis Zwirko, XYL of K1HTV, formerly AMSAT VP-Ops, has made a small AMSAT flag for Tony England to carry along with him to orbit next July.
- Gerd Schrick, WB8IFM, has taken over the operation of the publication, "UHF Compendium" formerly by Karl Weiner et al. Gerd states parts 1 and 2 are available in a single bound volume for \$20. Write him for info at 4741 Harlou Drive, Dayton, OH 45432.
- Paul Beeman, KA2MUM, New York City Area Coordinator, will be operating from Saint Martin from May 23 through May 29th. Frequencies will be 145.940 SSB and 145.885 CW. QSL via K2PWG. Thanks WA6VGS and N4IFD.

- The Isle of Mann DXpedition netted 603 QSOs including 38 states and 41 countries according to G3IOR.
- The RS satellites (5, 7 and 8) are doing well now that they're back in full sunlight, says UA3CR. RS-5 and 8 will be in transponder mode while RS-7 will be in robot until about 10 June. At that time a new operating schedule will be implemented to counter a new series of eclipses.
- AMSAT HQ is asking for donations of copies of old ORBIT magazines for binding into special edition volumes. If you have any back issue in good condition, please mail them to Martha at HQ ASAP. AMSAT, 850 Sligo Ave, Silver Spring, MD 20910.



AMSAT President WA2LQQ making a presentation at Dayton, '85.

New AO-10 Schedule

Provides Bonus Operating Time

A new AO-10 operating schedule went into effect 7 May. The change was announced on the AO-10 general beacon by command station ZL1AOX. Ian says the schedule is as follows:

	MA Start	MA End
Mode B:	032	119
Mode L:	120	136
Mode B	137	220
Off	221	031

The addition of 20 MA counts (almost a full hour) to the Mode B operating time was undertaken as an experiment to make the most of the excellent operating conditions now present. With sun angle very good, the attitude of the spacecraft has been aligned such that the Z-axis is aligned with the line of apsides. That means the Z-axis is at 180 degrees in the Bahn coordinate system and that the 23 cm helix points at the geo-center when AO-10 is at apogee.

The current schedule will be in effect for as long as conditions allow; probably not later than late June or early July at the latest. Analysts predict a major series of eclipses combined with dismal sun angles later this summer and fall. Cut-backs in operating time and reorientation of the satellite will be necessary they say.

Meanwhile, the next several weeks should see some of the best operating time ever on AO-10; perhaps the best so far in its life. AO-10 will be two years old 16 Jun 85; a few weeks hence.

Accident Claims Active AMSAT Member

AMSAT Life Member Bill Cooley, WB2YIK, has died in an automobile accident in suburban Binghamton, N.Y. according to long-time acquaintance Andy Deskur, KA1M. The accident occurred at approximately 11:45 PM EDT on Friday evening, 10 May. He was 35 years old and a bachelor.

According to KA1M, WB2YIK was spending the weekend at his mountaintop retreat near Binghamton where an elaborate ham shack was Bill's home away from home. According to reports he was on the way into town on a mountain road to buy some groceries when, apparently, the car he was driving skidded on some gravel, slid into a gully and struck a tree. He died in the car which was totally destroyed. There were no passengers in the vehicle.

Bill Cooley had been an ardent AMSAT member active on the satellites beginning with AO-6. Recently he had begun the enormous task of filling the shoes of Kaz Deskur, K2ZRO, in the Binghamton area regarding AMSAT presentations and satellite demonstrations in the New York and Pennsylvania vicinity. K2ZRO became a silent key just over a year ago. WB2YIK was a member of the Kopernik Society in Binghamton and was instrumental in the planning and implementation of the K2ZRO Memorial OSCAR Satellite station at the Observatory. Observatory Director Jay Sartor, said Bill's passing left a large gap in the volunteer staff at the observatory.



Bill Cooley, WB2YIK, at the dedication of the K2ZRO memorial station at the Kopernik Observatory in 1984. WB2YIK became a silent key recently (see story).

Bill was with the engineering department of a major cable TV concern. He is survived by his parents and a sister and both grandmothers. He had one niece. A licensed amateur for 22 of his 35 years, he was a regular at the AMSAT Annual Meetings. On May 14 he was buried in Brooklyn, Pennsylvania, with his cherished AMSAT callsign badge.

KA1M, WA2LQQ

[Editor's Note: I had personally known Bill Cooley for most of the years we both were active on OSCARs. He was one of the most enthusiastic hams I have known and was a superb CW operator. He ran rings around me in CW QSOs but always took care to avoid making me look too bad at it. I vividly recall trekking to the Goddard Space Flight Center in radio caravan with Bill and Kaz (K2ZRO) for the Annual Meeting. Seems to me he was part of the early Phase IIIA Operations planning sessions held at ARRL HQ as well. Last spring after the dedication of the K2ZRO Satellite Station at the Kopernik Observatory Bill gave me a very special tour of his ham shack of which he was very proud. He had lots of equipment for everything from ATV to RTTY. Above all, however, he cherished his OSCAR QSLs and station...and his memories of how "Kay" (rather than the less familiar "Kaz", K2ZRO) had lured him into this fascinating activity years earlier. Both are now sorely missed. How fragile this silver cord. Peace.]

DXCC-Satellite Award

Now Includes AO-10 QSOs

With the recommendation of AMSAT's Board of Directors last November, the way was cleared for the addition of AO-10 QSOs for credit towards ARRL's DXCC award with satellite endorsement. Now ASR has learned ARRL will announce shortly this change.

Many who favored the including AO-10 QSOs for credit

towards DXCC pointed to two justifications. First, they said that geography played favorites since some areas of the world, notably Europe, offered many more countries than others. Those who could reach Europe with Phase II satellites, they argued, could attain DXCC using them while others, not so favorably disposed geographically, could just sit back and dream. They thus looked towards the high-flying, broad coverage AO-10 as an equalizer in an otherwise "stacked deck."

Those who argued against inclusion of AO-10 contacts and felt they should not count towards DXCC pointed to the arduous task DXCC represented using Phase II satellites. They felt using AO-10 made it too easy and thus undermined the significance of the DXCC award. On the other hand proponents countered that there are barely 100 countries on AO-10 regularly and so it still represents a challenge of some magnitude.

Other opponents feared runaway high-power use, a trend, they said, which would be spurred by intense competition on the band.

Nevertheless, the AMSAT Board, having thoroughly reviewed the arguments, last November voted in favor of including AO-10 contacts in the DXCC satellite award. The majority felt the risks were justified in view of the potential for growth through new members the DXCC Satellite award would attract.

Packet Radio News

by W3IWI

Having just returned from the Dayton Hamvention I want to let all know of the exciting developments in Packet Radio. Let's start by describing the new products seen there.

Heathkit: The TAPR-clone HD4040 was very prominent. I was told that Heath's initial production run of 4040's was 500 units and represented a 3 month sales forecast — since their catalog came out earlier in April, they had delivered about 450 units, and had only 50 for sale at Dayton. The 50 were sold out before the weekend was over. Heath showed their new add-on status indicator box (which will also work with TAPR units, since the TAPR TNC-I and HD4040 are identical, and which will work with AEA units if the parallel port chip is installed for the same reason) — this little 2" cube indicates connect status, buffer status and even beeps when someone connects with you. One Heath-kit rep told me he is trying to get Heath to make their metal cabinets available for those TAPR owners that still are using a cardboard box or piece of plywood.

Kantronics: Kantronics showed their new "Packet Communicator" TNC. This 2"x6"x8" box looks like a smartmodem and lists for \$350 (available with discounts) — pictures can be seen in the most recent amateur magazines. The innards have something like 7 chips, and uses a 6803 processor. The code is adapted from TAPR's TNC-I code with several changes. The low-level routines that generate HDLC format and NRZI data are done in software rather than using a hardware HDLC controller chip. The async link to the user's terminal makes use of the UART built into the 6803; since everything is interrupt driven, this software approach does not seem to suffer from the ills of the GLB — time.

However, the software HDLC generation seems to be the reason that the maximum baud rate "on-the-air" is 1200 (supported speeds are 300, 400, 600 and 1200 baud). Since the high-level code is a clone of TAPR's, a TAPR user can step up to a Kantronics unit and operate it with complete familiarity. The Kantronics unit has a built-in modem using the single-chip Am 7910 "world" modem which offers both 103A (for HF use) and 202A (for VHF use at 1200 baud). It uses a 5-pin DIN connector for the radio interface, and operates from an external +12 VDC supply thru a 3.5 mm standard power connector. Kantronics advertisement promises special packet terminal ("Pac-Term") software for many popular computers in the near future; since the Kantronics user interface is identical to TAPR/Heath/AEA, it would seem to me that this software should be usable with with any of the TAPR-based TNC's.

HAL: The main-line RTTY manufacturer from Illinois introduced their TAPR-clone (intended primarily for commercial applications) in a beautiful 3.5" rack-mounted cabinet and priced at about \$1000.

TAPR TNC-II: The non-profit TAPR group made the big hit of the show by introducing their new TNC-II (sometimes called "tiny-TNC") controller. Physically, it looks almost identical to the new Kantronics unit (not surprising, since the aluminum extrusion used as a cabinet comes from the same manufacturer that supplies Kantronics) except that it is slightly longer (about 9"); interface connections are also essentially identical to the Kantronics, including a 5-pin DIN plug for the radio interface.

TAPR's new gem employs a Z80 cpu (hardware designed by AD7I) with the TNC software written in native Z80 assembly code (by N2WX); the operating software consumes about 12k bytes of ROM space and the user interface is essentially identical to the older TNC-I (a.k.a. Heath HD4040, a.k.a. AEA PKT-1). Memory on the TNC-1 consists of 3 byte-wide sockets with the RAM being CMOS with battery back-up (replacing the NOVRAM on TNC-I). HDLC generation uses one half of a Z80-SIO chip, and the async terminal uses the other half. The NRZI encoding/decoding and clock recovery is done with a DLL implemented as a finite-state-machine with a 2716 EPROM and 'LS373 byte-wide latch. The modem is a carbon copy of the XR2211/XR2206 design in TNC-I; The TNC-II also uses the same 20-pin external modem connector. Power requirements are +12 VDC only, with negative voltages for the RS232 terminal interface being derived from a small on-board DC/DC converter (a la the AEA PKT-1). The power consumption is < 3 watts when NMOS chips are used and falls to about 1.5 watts when the board is populated with CMOS logic.

It is my understanding that the functional differences from TNC-I are as follows:

- The support of VADGC V.1 protocol has been dropped.
- TNC-I's NOVRAM had two "banks" which could contain different set-up parameters; TNC-II has only one "bank" in its battery powered CMOS RAM.
- TNC-I had an initial "autobaud" routine for setting the terminal baud rate during cold restarts; TNC-II's terminal baud rate is set with a dip rocker switch on the rear panel.
- TNC-I had up to 16 possible HDLC baud rates settable under software control, while TNC-2 has 8 baud rates set by rocker switches (unless an external clock is provided).

TNC-II's maximum baud rate is 9600 baud with the internal baud rate clock (although 56 kbaud should be possible with an external clock).

- The parallel I/O port (usually not used except by status indicators like the new Heath box mentioned earlier) is not supported. However, front panels LED's on TNC-II show "connected" and "TNC has unacknowledged packets" status functions.
- TNC-II firmware supports AX.25 Rev.2 specifications. Rev.2 firmware for TNC-I won't be available 'till summer.
- A number of new functions have been added, which will be described in later reports after I get my hands on a real, live TNC-II.

TAPR indicates that the initial production batch of 300 units will be available sometime this summer. So far, about 8 units have been fabricated from a "Beta" test batch of 25; the other 17 "Beta" units will be making it into the field in early May. In the MAPRC area there will be two of the initial test units — WB4JFI to test compliance with AX.25 Rev.2 and W3IWI to test compatibility with applications like WØRLI PBBS's and suitability for certain AMSAT/PACSAT related tasks. TAPR will not take orders for the TNC-II until it is ready to make the initial production run of 300 units.

Oh yes — VERY IMPORTANT — The price announced for TNC-11 is \$185 (in kit form) including the cabinet!

K9NG 9600 Baud Modems: Steve Goode gave another presentation on his 9600 baud hardware at one of the Dayton forums and his prototypes were running in the TAPR booth. TAPR has produced artwork for the modem boards and the initial verification batch of 5 boards will be available for Steve to evaluate next week. After PCB verification, an initial batch of about 100 boards will be made (presumably in June) to act as a "seed" for network tests elsewhere. The K9NG design assumes a radio with direct FM capability (i.e. a varactor in the xtal oscillator) on xmit, a rcvr with about 12 kHz bandwidth (typical FM radio) with a direct connection to the discriminator output. The interface to the TNC is via a ribbon cable to the 20 pin dip header "external modem" connector on TNC-I, TNC-II, AEA or HD4040 TNC's.

AMSAT Videotape Library

Current Tapes Available

- #1 OSCAR The Satellite You Can Use — A narrated slide program outlining the history of amateur satellites. Also includes a silent film of the attempts to launch the Phase III-A satellite. (VHS and Beta II)
- #2 Orbital Simulation Tape — A computer simulation of the earth as it would appear from OSCAR 10. Lasts only about one minute. (VHS only)
- #3 Amateur Radio's Newest Frontier — The original ARRL tape of the W5LFL STS-9 flight in December 1983. (VHS only)

Tapes 4 through 8 were produced at the 1983 AMSAT annual meeting.

- #4a OSCAR 10 — Its design technology and construction by Jan King.
- #4b The Mode L Transponder by Jan King. 01:49 (VHS only)
- #5a OSCAR 10 operations and ground station requirements by Doug Loughmiller.
- #5b Map based on tracking systems for OSCAR 10 by Marty Davidoff.
- #5c Personal computer based orbital predictions and tracking programs by Bob Diersing. 01:42 (VHS only)
- #6a Independent Space Project Committee by Ron Molz.
- #6b The Solar Sail Project by John Champa.
- #6c The Amateur Space Telescope by Jesse Eichenlaub.
- #6d Amateur Satellite Programs: Worldwide Activities by Tom Clark. 02:03 (VHS only)
- #7a Packet Communications: PACSAT, UoSAT B
- #7b Circularly polarized antennas by Marty Davidoff. 01:49 (VHS only)
- #8a Analysis of engineering problems facing OSCAR 10 by Phil Karn.
- #8b Spacecraft Technology Status: Panel Discussion by Jan King, Richard Daniel, and Phil Karn. 02:00 (VHS only)
- #9 Integration and Launch of OSCAR 10 — 30 minute program showing scenes of development and launch of OSCAR 10. (VHS)

Tapes 10 through 13 are from the 1984 Second Annual Radio Amateur Satellite Symposium. All are VHS only.

- #10 Introduction; Advanced Gateway Concept, Al Dayton; JAS-1, Harry Yoneda JA1ANG; Project Companion — Amplitude Companded Sideband, Paul Rinaldo W4RI & Jim Eagleson.
- #11 Computers and Satellites, Robert Diersing N5AHD; Finn Steenstrup Memorial Presentation, Vern Riportella WA2LQQ; Solar Sail Project, Mark Bergham, Robert Staehle, & Chauncey Uphoff.
- #12 PACSAT Forum, Harold Price NK6K, Wally Lindstruth WA6JPR, Rick Fleeter WA8VGK, Phil Karn KA9Q, & Martin Sweeting G3YJO; Satellite Economics, Tom Clark W3IWI; Ham in Space Activities, Bill Tynan W3XO.
- #13 Phase IV and Future Projects, Vern Riportella WA2LQQ.
- #14 The UoSAT-2/OSCAR 11 Story. A brief account of the development and launch of the bird. With musical accompaniment. (VHS only)

Tapes are available for a fee of \$6.00 per tape. A check for this amount plus a second deposit check for \$25.00 should be mailed. The latter will be returned when the tape is received in good condition. Tapes may be kept by the user for a period of 3 weeks from the time of delivery. All correspondence regarding the tapes should be sent to 1627 36th Ave. Ct., Greeley, CO 80634.

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